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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/774,869 | 02/09/2004 | Song-Hua Shi | 008410.P13250D | 8825 |
| 76225 | 7590 | 03/05/2009 | | |
| NUMONYX/BLAKELY Blakely Sokoloff Taylor & Zafman LLP 1279 OAKMEAD PARKWAY SUNNYVALE, CA 94085 | | | EXAMINER IM, JUNGHWA M | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|-----------------------------------|--|
| Office Action Summary | Application No. 10/774,869 | Applicant(s) SHI ET AL. | |
| | Examiner JUNGHWA M. IM | Art Unit 2811 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 December 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,7 and 8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,7 and 8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3, 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA (Applicant's Admitted Prior Art) in view of Yoshihara et al. (US 2001/0008300), hereinafter Yoshihara, Lau (US 2002/0170901), and Wang et al. (US 6258626), hereinafter Wang.

Regarding claim 1, Fig. 2 of AAPA shows a package by a method of forming a package, comprising:

placing a film (28) against a flip-chip assembly, wherein the flip-chip assembly includes a die (12), an electrical connection (16), and a mounting substrate (14);
underfilling the die with underfill material (18); and
curing the underfill material.

Fig. 2 of AAPA shows most aspects of the instant invention except "wherein the film includes a tacky film" and "curing the underfill material and after beginning curing the underfill material, removing the film, wherein after beginning curing the underfill material and removing the film, curing includes heating the package in a curing oven under conditions to cause the tacky film to release from the flip-chip assembly." Fig. 2C of Yoshihara shows an adhesive (tacky) film (2, 7) over the semiconductor assembly

(1). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate that teachings of Yoshihara into the device of AAPA in order to have the film including a tacky film to protect the device.

The combination of AAPA/Yoshihara fails to show “curing the underfill material and after beginning curing the underfill material, removing the film, wherein after beginning curing the underfill material and removing the film, curing includes heating the package in a curing oven under conditions to cause the tacky film to release from the flip-chip assembly.” Lau discloses that the adhesive could be removed at less than 200° C (paragraph [0055]). And Wang discloses an under-fill curing process in the oven including a pre-curing at 120° C and post-curing at 150° C (col. 1, lines 31-36). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate that teachings of Lau and Wang into the device of AAPA/Yoshihara in order to have curing the underfill material in the oven and after beginning curing the underfill material, removing the film during pre-curing to reduce the process steps.

Regarding claim 3, Yoshihara shows that the film includes a tacky film, and the combination of Lau/Wang would show that curing the underfill material is carried out under heat, therefore, the combination of AAPA/Yoshihara/Lau/Wang would show that the heat during the curing causes the tacky film to release from the flip-chip assembly.

Regarding claims 7-8, Lau discloses that the adhesive could be removed at less than 200° C (paragraph [0055]) and Wand discloses that an under-fill curing process in the oven including a pre-curing at 120° C and post-curing at 150° C and cooling (col. 1, lines 31-36). Therefore, the combination of AAPA/Yoshihara/Lau/Wang would show

after beginning curing the underfill material and removing the film, curing includes: heating the package in the curing oven under conditions to cause the tacky film to release from the flip-chip assembly, wherein heating includes a first temperature ramp to a temperature range from about 100° C to about 180° C, a temperature hold at a temperature in this range, a second temperature ramp to a temperature range from about 140° C to about 260° C, and cooling. And after beginning curing the underfill material and removing the film, curing includes: heating the package in the curing oven under conditions to cause the tacky film to release from the flip-chip assembly, wherein heating includes a single step temperature ramp to a temperature in a range from about 140° C to about 240° C; and cooling.

Response to Arguments

Applicant's arguments filed 12/04/2008 have been fully considered but they are not persuasive.

Applicants argue that "Applicant denies, however that 'Fig. 2C of Yoshihara shows a (sic) adhesive (tacky) film over the semiconductor assembly 1' that one of ordinary skill in the art at the time that the invention was made would be likely to incorporate into the method claimed in claim 1. There is nothing shown in Yoshihara suggesting curing underfill material and 'after beginning curing the underfill material and removing the film, curing includes heating the package in a curing oven under conditions to cause the tacky film to release from the flip-chip assembly.'" This is not persuasive. Fig. 2C of Yoshihara is referred to show a tacky film formed on

semiconductor assembly not a curing process of underfill material. That is, Yoshihara is referred to show that it is well known to one of ordinary skill in the art at the time that the invention was made to have a tacky/adhesive film on the semiconductor assembly for protection of the device. Lau and Wang are further referred to show the process as recited in the claim.

Applicants argue that "Neither Yoshihara nor Lau nor Wang relate to a package forming method as claimed in claim 1 using a tacky film released by heating the package and the film during curing. Lau and Wang were apparently cited merely for their reference to the fact that curing of certain adhesives can occur at temperatures below that at which the adhesives release their bond." This is not persuasive. Note that the claim recites that "curing the under fill material; ... curing includes heating the package in a curing oven under conditions to cause the tacky film to release from the flip-chip assembly." Note that Wang discloses an under-fill curing process in the oven including a pre-curing at 120° C and post-curing at 150° C while Lau discloses that the adhesive could be removed at less than 200° C. Therefore, a tacky/adhesive film of Lau could be removed by using Wang's under-fill curing process.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JUNGHWA M. IM whose telephone number is (571)272-1655. The examiner can normally be reached on MON.-FRI. 7:30AM-4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne A. Gurley can be reached on (571) 272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Lynne A. Gurley/
Supervisory Patent Examiner, Art Unit 2811

/J. M. I./
Examiner, Art Unit 2811